

Klamath National Forest Best Management Practices

REGION 5 EVALUATION PROGRAM WATER QUALITY MONITORING REPORT 2010 Fiscal Year

Evaluation of Forest Service administered projects including timber sales, roads, grazing, recreation sites, fuels reduction, in-channel construction and road decommissioning.

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Natural Resources Staff
1312 Fairlane Road
Yreka, CA 96097

KLAMATH NATIONAL FOREST 2010 BEST MANAGEMENT PRACTICES (BMP)

SUMMARY

Fiscal year 2010 was the nineteenth year of the Best Management Practices Evaluation Program (BMPEP) on the Klamath National Forest (Forest) and the Forest Service Pacific Southwest Region (Region). This program is designed to evaluate how well the Forest and the Region implement BMPs and how effectively the BMPs control water pollution from National Forest lands. Onsite evaluations have been divided into 29 possible “activity groups” (categories) that look at related management practices. In the 2010 fiscal year, Klamath National Forest staff evaluated timber, engineering, range, recreation, minerals, and restoration projects to determine whether BMPs were implemented and effective. Twenty-one different protocols were used to evaluate a total of fifty-nine sites. Each protocol is designed to measure implementation and effectiveness of an activity category that includes from one to six related BMPs. Appendix A is a table that cross-walks each protocol/activity category alpha-numeric code with its name and the BMPs it is designed to monitor.

The Forest’s BMPEP is composed of two sampling strategies. The first is the evaluation of randomly sampled sites, where data are collected and entered into a Regional database. The second strategy is non-random monitoring, in which sites are selected based on management interest in specific ongoing projects. These sites are often evaluated concurrently (“real time”) and can be qualitative as well as quantitative. Most randomly sampled site evaluations require that 1 to 2 winters have passed prior to completing the field assessment; however, the in-channel construction protocol requires at least one sample per site to be done during the active project phase. The site evaluations followed protocols described in *Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User’s Guide* (USDA, Forest Service, 2002). The random samples were selected from a pool of eligible sites. In cases where the sample pool is very small, either all eligible sites are evaluated, or selection is done in a way that does not bias which sites are selected. The results of the random and non-random evaluations are summarized here.

Randomly sampled sites: In 2010, 59 sites were randomly drawn and evaluated from Forest activity pools and each was reviewed for BMP implementation and effectiveness. Timber (16 sites), prescribed fire (6 sites), road and engineering (25 sites), recreation (4 sites), grazing (4 sites), mining operations (1 sites), and in-channel construction (3 sites) activities were evaluated. Sites were located on all Ranger Districts (Oak Knoll, Happy Camp, Salmon River, Scott River, and Goosenest).

BMP Implementation was evaluated to determine whether: (1) we did what we said we were going to do to protect water quality; and (2) project environmental documentation and/or contract/permit language was sufficient to ensure water quality protection. BMP effectiveness was evaluated to determine if water quality protection measures met objectives. The objective for meeting most evaluation criteria is keeping all sediment out of channels and near-channel areas. Sediment deposition presence, volume and proximity to the nearest watercourse were used to indicate level of effectiveness.

In 2010 BMPs were fully implemented at 100% of the sites evaluated and fully effective at 88% of the sites evaluated. Five percent of the effectiveness ratings fell into a new “at-risk” category. This is a new feature for the 2010 report that brings attention to sites that do not currently have negative impacts to water quality, but are at-risk if conditions worsen. Seven percent of the sites did not meet effectiveness requirements in 2010. Table 1 summarizes the results of the BMP Random Site Evaluation Program for 1992 through 2010.

Non-Randomly sampled sites: Several sites were selected for concurrent monitoring because the activities and their proximity to watercourses pose a potentially high risk for sediment discharge. These sites are not included in Tables 1. They are discussed in the Summary of Non-Random Site Evaluations section.

Table 1. BMP Random Site Evaluation Program from 1992 through 2010.

Monitoring Years	Total # of Sites Monitored	Sites Meeting BMP Evaluation Criteria			
		Implementation		Effectiveness	
		% Rated At-risk*	% Rated Successful	% Rated At-risk*	% Rated Successful
1992	53	N/A	55%	N/A	81%
1993	77	N/A	79%	N/A	94%
1994	52	N/A	75%	N/A	89%
1995	77	N/A	83%	N/A	96%
1996	57	N/A	84%	N/A	98%
1997	60	N/A	100%	N/A	98%
1998	54	N/A	65%	N/A	98%
1999	38	N/A	66%	N/A	89%
2000	45	N/A	89%	N/A	96%
2001	64	N/A	88%	N/A	95%
2002	53	N/A	92%	N/A	96%
2003	51	N/A	80%	N/A	90%
2004	53	N/A	94%	N/A	100%
2005	48	N/A	96%	N/A	98%
2006	45	N/A	93%	N/A	100%
2007	57	N/A	98%	N/A	96%
2008	50	N/A	78%	N/A	92%
2009	63	N/A	97%	N/A	98%
2010	59	0%	100%	5%	88%

*2010 was the first year the “At-risk” category was added

2010 BMP MONITORING REPORT

INTRODUCTION

On-site evaluations are the core of the BMP Evaluation Program. Such evaluations are necessary to meet the requirements of a Management Agency Agreement between the Region and the State of California. There are 29 different evaluation procedures designed to assess a specific practice or set of closely related practices. Though the evaluation criteria vary based on the management activity, the evaluation process is similar amongst activities. The Regional Office annually assigns the type and number of management activities to be evaluated on each Forest. The specific sites for each evaluated management activity are randomly selected from Forest project pools. Statistical analyses are periodically performed from the collective Regional data, and annual reports of Region wide BMP implementation and effectiveness are presented to the State and Regional water boards.

The criteria for sample pool development are Regionally standardized by activity type and described in the BMPEP User's Guide (2002). Some minor changes in the forms for E10 (road decommissioning) and G24 (grazing) forms resulted from field protocol testing on the Forest in 2005.

In addition to the random sample sites, projects are selected that are of management interest with regard to timely water quality protection implementation. Evaluation of these non-randomly selected sites is often called "concurrent" BMP monitoring because it is accomplished while the project is actively operating. Feedback is immediate and remedial action can be taken. However, comprehensive assessment of BMP effectiveness is not possible since there has not been a post-project winter season to test the protection measures. In addition to the BMPEP, contract compliance monitoring is done concurrently, and assesses BMP implementation along with other project resource protection measures.

BMP monitoring strives for an interdisciplinary evaluation of projects and actively involves project proponents and watershed personnel. This interdisciplinary effort provides direct feedback to the project proponent on how well the BMP was implemented and allows for adaptive management on future project designs.

Earth scientists Joe Blanchard, Tom Laurent, Gregg Bousfield, Greg Laurie, Angie Bell, and William Snively, range conservationist Stephanie McMorris, and District project leaders conducted the 2010 BMP evaluations.

2010 PROGRAM OVERVIEW AND METHODS

Randomly Sampled Site Monitoring

Fifty-nine sites were sampled from within 23 6th field watersheds on the Forest (Table 2). The following is a breakdown of the type of activities sampled on timber, engineering, range, recreation, minerals, grazing, and restoration projects:

Table 2. Summary of 2010 BMP Implementation and Effectiveness Success Rate by Individual BMPs and 6th Field Watershed Location. (Randomly sampled sites only)

Form	Project/Site	Implementation	Effectiveness	6 th Field Watershed
T01	Cold Creek unit 2	Pass	Pass	Pollic Flat
T01	Tennis Thin unit 5	Pass	Pass	Upper Cottonwood Creek
T01	Tennis Thin unit 2	Pass	Pass	Upper Cottonwood Creek
T01	Colstine unit 5	Pass	Pass	Upper Cottonwood Creek
T02	Colstine Stewardship unit 504	Pass	Pass	Upper Cottonwood Creek
T02	Colstine Stewardship unit 2	Pass	Pass	Upper Cottonwood Creek
T02	Cold Creek unit 3	Pass	Pass	Pollic Flat
T03	Tennis Thin unit 2	Pass	Pass	Upper Cottonwood Creek
T03	Tennis Thin unit 6	Pass	Pass	Upper Cottonwood Creek
T04	Colstine Stewardship unit 504	Pass	Pass	Upper Cottonwood Creek
T04	Colstine Stewardship unit 2	Pass	Pass	Upper Cottonwood Creek
T04	Cold Creek unit 3	Pass	Pass	Pollic Flat
T04	Cold Creek unit 3	Pass	Pass	Pollic Flat
T05	Tea Garden Unit 6	Pass	Pass	Little North Fork Salmon River
T06	Colstine Stewardship unit 2	Pass	Pass	Upper Cottonwood Creek
T06	Colstine Stewardship unit 504	Pass	Pass	Upper Cottonwood Creek
E08	Elk Creek Sed. Source Red. 15N43(1)	Pass	Pass	Lower Elk Creek
E08	Elk Creek Sed. Source Red. 15N43(2)	Pass	At risk	Lower Elk Creek
E08	Elk Creek Sed. Source Red. 16N05	Pass	Pass	Lower Elk Creek
E08	Elk Creek Sed. Source Red. 15N06	Pass	At risk	Lower Elk Creek
E09	Elk Creek Sed. Source Red. 15N43(1)	Pass	Pass	Lower Elk Creek
E09	Elk Creek Sed. Source Red. 15N43(2)	Pass	Pass	Lower Elk Creek
E09	Elk Creek Sed. Source Red. 16N05	Pass	Fail	Lower Elk Creek
E09	Elk Creek Sed. Source Red. 15N06	Pass	Fail	Lower Elk Creek
E09	Deep Timber Sale Skid trail	Pass	Pass	Tompkins Creek-Scott River
E10	45N74	Pass	At risk	Tompkins Creek-Scott River
E10	38N40B	Pass	Pass	Crawford Creek-South Fork Salmon River
E10	38N01	Pass	Pass	Garden Gulch-South Fork Salmon River
E11	Elk Creek Sed. Source Red. 15N43(1)	Pass	Pass	Lower Elk Creek
E11	Elk Creek Sed. Source Red. 15N43(2)	Pass	Pass	Lower Elk Creek
E11	Elk Creek Sed. Source Red. 16N05	Pass	Pass	Lower Elk Creek
E11	Elk Creek Sed. Source Red. 15N06	Pass	Pass	Lower Elk Creek
E13	China-Fish Gulch Aquatic Passage 47N77	Pass	Fail	Horse Creek
E13	China-Fish Gulch Aquatic Passage 46N03	Pass	Fail	China Creek-Klamath River
E13	Upper West Branch Fish Passage FS 48	Pass	Pass	Upper Indian Creek
E14	Tennis Thin unit 4	Pass	Pass	Upper Cottonwood Creek
E16	Tennis Thin Road 11	Pass	Pass	Swillup Creek-Klamath River
E16	China Ray TS 37N07	Pass	Pass	Garden Gulch-South Fork Salmon River
E17	15N19	Pass	Pass	North Fork Dillon Creek
E17	37N14	Pass	Pass	Garden Gulch-South Fork Salmon River
E17	10N29	Pass	Pass	Crapo Creek-Salmon River
E19	Horsethief	Pass	Pass	Horsethief Creek
E20	40N45	Pass	Pass	Little North Fork Salmon River
E20	40N51	Pass	Pass	Little North Fork Salmon River
R22	BEAVER CREEK	Pass	Pass	Dutch Creek-Beaver Creek

R30	Redbank River Access	Pass	Pass	Olsen Creek-North Fork Salmon River
R30	Thomaine River Access	Pass	Pass	Olsen Creek-North Fork Salmon River
R30	Jackass Gulch River Access	Pass	Pass	Whites Gulch-North Fork Salmon River
G24	Etna Creek	Pass	Pass	French Creek
G24	Eagle Creek	Pass	Pass	South Fork Scott River
G24	East Fork	Pass	Pass	Picayune Creek-Trinity River
G24	Mount Hebron	Pass	Pass	Horsethief Creek
F25	Glassups Underburn unit 165	Pass	Pass	Whites Gulch-North Fork Salmon River
F25	Glassups Underburn unit 172	Pass	Pass	Whites Gulch-North Fork Salmon River
F25	Glassups Underburn unit 160	Pass	Pass	Whites Gulch-North Fork Salmon River
F25	HCFP phase 2 Underburn Perkins Gulch	Pass	Pass	Lower Indian Creek
F25	Greenthin 87 Underburn	Pass	Pass	Upper Indian Creek
F25	Switchback Underburn	Pass	Pass	McAdam Creek
M27	Butte Creek	Pass	Pass	Blue Canyon-Dry Lake

Timber

Timber Activities that were sampled that fell into the following activity groups: Streamside Management Zones (T01), Skid Trails (T02), Suspended Yarding (T03), and Landings (T04), Timber Administration (T05), and Special Erosion Control and Revegetation (T06). Twenty-four sites were sampled on three Districts. A total of 16 timber monitoring sites were sampled with 100% implementation and 100% effectiveness.

Engineering

The following activity groups were sampled: Road surfacing, drainage and protection (E08), Stream Crossings (E09), Road Decommissioning (E10), Control of Sidecast Materials (E11), In-channel Construction Practices (E13), Temporary Roads (E14), Snow Removal (E17), Water Source Development (E16), Restoration of Borrow Pits and Quarries (E19), and Protection of Roads (E20). A total of 28 engineering sites were evaluated with 100% implementation, while 75% were fully effective, 11% were at-risk, and 14% were ineffective.

Fire

One activity Group, Prescribed Fire (F25) was evaluated at six separate sites. All prescribed fire sites were evaluated as 100% implemented and 100% effective.

Range

One Activity Group, Range Management (G24) was evaluated at four separate range allotments on two Districts. All prescribed key areas were evaluated as 100% implemented and 100% effective.

Recreation

These two activity groups were evaluated: Developed Recreation (R22) and Dispersed Recreation (R30). A total of 4 sites were sampled on two Districts. All recreation sites were evaluated as 100% implemented and 100% effective.

Minerals

One activity group, Common Variety Minerals (M27), was evaluated as implemented and effective.

Sample Pool

Data collection methods are specific for each BMP activity group and are described in the BMPEP User's Guide (USDA, Forest Service, 2002). One Forest modification is that BMP evaluations which require soil cover monitoring use the Forest's soil cover monitoring procedures developed in 1998.

Data gathered for each BMP are used to answer specific questions on BMP evaluation forms. Management activities (e.g. timber projects, roads, prescribed fire, tractor piling) to be evaluated must: 1) be implemented under a NEPA decision; 2) adhere to contract requirements; and 3) have been completed at least one but not more than 3 winters prior to evaluation. In-channel construction BMP evaluations (E-13) are conducted during the activity and immediately after completion.

The timber, silvicultural and engineering project sample pools were developed from a list of timber sales logged the previous year. Decommissioned road samples were taken from the Forest-wide Decommissioned Roads Database. The prescribed fire sample pool was developed from a list of completed prescribed fire projects. The recreation sample pool included all known developed and dispersed recreation sites on the Forest. The grazing sample pool was a list of active grazing allotments on the Forest.

Non-Randomly Sampled Site (“Concurrent”) Monitoring

Data collection was similar to that used for randomly sampled sites; however, some data may be more qualitative than those collected using the strict Regional protocol. Often the same forms are used. Data are stored in a Forest database but are not entered into the regional database or numerically scored. Narrative reports often present or supplement the evaluation.

SUMMARY OF RANDOM SAMPLING RESULTS BY ACTIVITY GROUP

Timber Activities

T01 Streamside Management Zones (4 sites)

Cold Creek Unit #2, Goosenest District

Streamside management zone (SMZ) prescription was 50ft riparian reserve buffer on an intermittent stream. Canopy cover was slightly below objective and streambank disturbance was measured on less than 5% of the channel length.

Tennis Thin Units #2 and #5, Oak Knoll District

Streamside management zone (SMZ) prescription was 50-75ft riparian reserve buffer on an intermittent stream. Implementation and effectiveness met or exceeded requirements.

Colestine Unit #5, Oak Knoll District

Streamside management zone (SMZ) prescription was 50-75ft riparian reserve buffer on an intermittent stream. Implementation and effectiveness met or exceeded requirements.

The sampled SMZs met BMP implementation and effectiveness evaluation requirements.

T02 Skid Trails (3 sites)

Colestine Unit #504, Oak Knoll District

The skid trails utilized slash instead of water bars to control runoff and erosion. Areas where slash was spread had 70-90% effective soil cover. There was no rill erosion on skid trails nor at the outlets created by the slash. There was evidence of sheet erosion. Areas of slash were at least 25 feet long.

Colestine Unit #2, Oak Knoll District

The skid trails utilized slash instead of water bars to control runoff and erosion. Most skid trails had a 15% slope gradient. The use of slash was very effective in controlling runoff and erosion. There was no rilling where slash diverted potential runoff to undisturbed areas. Lots of litter material covered skid trails. Areas where slash was spread had 70-90% effective soil cover. There was no rill erosion on skid trails nor at the outlets created by the slash. There was evidence of sheet erosion. Areas of slash were at least 25 feet long.

Cold Creek Unit #3, Goosenest District

Four skid trails were evaluated. The water bars on the skid trails were all properly functioning and effective. There was some evidence of sheet erosion on some of the skid trails. No sediment left the outlet areas of the waterbars. There were no channels anywhere near this unit. No sediment reached any channel. Some of the skid trails were hard to find because the amount of skidding was low because this unit was a small unit and not many trips were made on each skid trail. The amount of soil cover was high in some of the skid trails.

Skid trails met BMP implementation and effectiveness requirements.

T03 Suspended Yarding (2 sites)

Tennis Thin Unit #2, Oak Knoll District

The suspended yarding pertained to one end suspension of logs during haul back to the landing. Four cable corridors were evaluated in this unit. Overall, there was only minor evidence of ground disturbance. Three of the four corridors were perpendicular to the slope. These showed the least evidence of ground disturbance. Corridor 4 was at an angle to the slope, which resulted in a small berm (6-12 inches tall) to be developed on the downhill side of the corridor. This corridor was approximately 5 feet wide. There was mostly 80-95% ground cover in corridors 1-3 and variable cover in corridor 4, from 25-95%. There was no downcutting in the corridors from dragging the rear end of the logs. In fact, the corridors were very difficult to locate on the ground. The main evidence of a corridor was the cable rub evidence on trees along the margins of the corridor. No water bars were installed because they were not needed due to the high amount of ground cover and very little ground disturbance.

Tennis Thin Unit #6, Oak Knoll District

The suspended yarding pertained to one end suspension of logs during haul back to the landing. Three cable corridors were evaluated in this unit. Overall, there was only minor evidence of ground disturbance. All three corridors were perpendicular to the slope. These corridors had very little ground disturbance. Low growing vegetation was mostly still intact. There was mostly 95% ground cover in all three corridors. There was no downcutting in the corridors from dragging the rear end of the logs.

These corridors were also very difficult to locate on the ground. The main evidence of a corridor was the cable rub evidence on trees along the margins of the corridor. No water bars were installed because they were not needed due to the high amount of ground cover and very little ground disturbance.

Suspended yarding corridors met BMP implementation and effectiveness requirements.

T04 Landings (4 sites)

Colestine Unit #504, Oak Knoll District

The evaluated landing was located adjacent to road on a small ridge or knob. This is a very small landing. There was a slash pile left on the landing. There was adverse skidding up to this landing. The main skid trail (skid road) used to bring logs to this landing had both waterbars and slash spread on it. Areas of slash had approximately 95% soil cover. Areas of slash were 25-50 feet long.

Colestine Unit #2, Oak Knoll District

The evaluated landing was on a ridge top accessed by a ridge top temp road. The road went through the landing. This landing had a very small amount of fill slope. The road on both sides of the landing had waterbars to collect potential landing runoff and prevent it from reaching the main road or other areas. There was no rill erosion on landing or on road through landing. Some sheet erosion was evident on road.

Cold Creek Unit #3, Goosenest District

Two landings were evaluated. The first was at the end of the G spur road. This is a small landing. There was a slash pile left on the landing. There was no fill slope. There were no rills evident on the landing nor on the road heading away from the landing. There were no channels anywhere near this landing. There was a fireline around the slash pile.

Landings met BMP implementation and effectiveness requirements.

T05 Timber Administration (1 sites)

Erosion control was reviewed on the Tea Garden sale within the Salmon River District. Operations were stopped after periods of heavy rain. Slight rutting on roads occurred, but was limited by timely closure.

Active Timber Sale Administration met BMP implementation and effectiveness requirements.

T06 Special Erosion Control (2 sites)

Colestine Unit #504, Oak Knoll District

Special erosion control measure was the spreading of slash on the main skid trail (skid road) up to the upper landing next to the main road. Area that was slashed was from the landing to the first waterbar, which was approximately 100 feet. Slash cover was approximately 90% effective soil cover.

Colestine Unit #2, Oak Knoll District

Special erosion control measures was the spreading of slash on skid trails. Areas where slash was spread had 70-90% effective soil cover. There was no rill erosion on skid trails nor at the outlets created by the slash. There was evidence of sheet erosion. Areas of slash were at least 25 feet long.

Special Erosion Control met BMP implementation and effectiveness requirements.

Road Engineering Activities

E08 Road Surface, Drainage and Slope Protection (4 sites)

Elk Creek Sediment Source Reduction, Happy Camp District

This stomproofing project started in 2008 and was completed in 2009. Four sites were evaluated on roads 15N06, 15N43, & 16N05. Three forms, **E08, E09, and E11**, were filled out at each site. Two sites were rated as “at-risk” for failing effectiveness measurements for E08. On road 15N06, a decomposed granitic fill slope was not adequately mulched and/or armored resulting in numerous large rills and gullies which transported sediment to the outlet (Figure 1). This could have been an oversight in the design of the crossing and/or contract requirements. On road 15N43, rills were present on the fill slope but did extend greater than the slope length below the toe and sediment was deposited in the stream management zone but did not enter the channel

Road Surface, Drainage, and Slope Protection met BMP implementation and effectiveness requirements

E09 Stream Crossing (5 sites)

Elk Creek Sediment Source Reduction, Happy Camp District

Four sites were evaluated on roads 15N06, 15N43, & 16N05. Two sites were rated as failing effectiveness measurements for E09. On road 16N05, problems with culvert diversion potential and plugging lead to effectiveness failure. Sediment and debris was starting to accumulate in the culvert and if the culvert were to fail, flow would be diverted out of the channel and down the roadway. However, the road and surrounding landscape is nearly flat (less than 2% slope) which would result insignificant water quality impacts should the culvert plug and divert down the road way. On road 15N06, lack of effective soil cover on fill slopes and numerous rills with evidence of sediment delivery to the channel lead to effectiveness failure (Figure 2). One of the two stream crossings on road 15N43 had scour evident more than two channel widths below the outlet, but was rated as effective because water quality was not adversely affected.

Deep Timber Sale, Scott River District

One site was evaluated at a skid trails crossing site of an intermittent stream. This site met all requirements for BMP implementation and effectiveness.

Stream Crossing met all BMP implementation requirements but failed effectiveness requirements at two out of five sites

E10 Road Decommissioning (3 sites)

All three sites passed evaluation criteria for implementation. Decommissioning of road 45N74 was rated at risk for failing effectiveness. For each case, project-specific notes follow.

Road 47N74 – The decommissioned USFS road 45N74 evaluated was 1.25 miles with elevation ranging from 2900 feet to 3000 feet. The road is mainly in granitic bedrock and about 350 feet above Tompkins Creek on the Scott River District. The takeoff of the road was bermed and steeply out-sloped effectively preventing use of the road. The road is out-sloped (8-10%) for 0.7 miles to farthest fill that was removed. There were 8 stream crossings along the road only two were removed. The two fills that were removed were not taken all of the way to the channels original slope and showed a little down-cutting and adjustment. This was minor (<12” of downcutting) and the channel was beginning to vegetate and

stabilize. The other fills were rock fills or armored fills. The landing at the end of the road was out-sloped and well vegetated with no rilling or gullying.

Road 38N40B – The decommissioned portion of 38N40B observed was approximately 0.6 miles long with elevations ranging from 3,500 ft to 3,600 ft. This stretch of road was roughly 1,200 ft above the South Fork of the Salmon River in metamorphosed sedimentary formations. Along 38N40B there were no major concerns to report. Although there is a portion of this road with no groundcover and had rills which were approximately 1 inches in width and ran for roughly 100 ft. These features were minor and had no connectivity to the streams in the area. There were not stream crossings to evaluate.

Road 38N01 – The decommissioned portion of 38N01 is approximately 1.5 miles long and ran parallel to the South Fork of the Salmon River. The entire road was not decommissioned; the work was done on only the southernmost section of 38N01. This portion of road was made up of fluvial deposits and metamorphosed sedimentary formations. Elevations ranged from 2,500 ft to 2,700 ft and the road was within 30-500 ft of the river. The road was evaluated starting from the 38N01 and traversed south toward 37N07. There was no evidence of recent use of the roadway, but the new grass made it impossible to tell if the road had been used in the recent past. The berm is not enough to prevent use of the road and in fact draws attention to the takeoff. There are several ‘wildlife’ ponds that have been created by berming springs in the meadow. The road has captured flowing water from these springs for the first 300 feet of the decommissioned road. There were three stream crossings which were in good condition with armored beds and no diversion potential. The road bed was a properly out-sloped with good groundcover and no rills or gullies. A 1000 feet stretch of road was missing roughly ½ mile from the berm on 38N01. It is suspected that this missing portion of road ran close to the river and is now imperceptible due to erosion. This was most likely the main reason for the decommissioning and not a result of the decommissioning. The berm at the end of the roadway is a bit more effective in preventing traffic due to the nature of the takeoff.

Road Decommissioning met BMP implementation and effectiveness requirements

E11 Control of Sidecast Material (4 sites)

Elk Creek Sediment Source Reduction, Happy Camp District

Four sites were evaluated on roads 15N06, 15N43, & 16N05. The only problem that was encountered was on road 15N06 were less than 10% of the surveyed stream management zone length had evidence of sidecast material, but the site was still rated as fully effective.

Control of Sidecast Material met BMP implementation and effectiveness requirements

E13 In-Channel Construction Practices (3 sites)

China-Fish Aquatic Passage, Happy Camp and Oak Knoll Districts

This Active project E13 evaluation was completed for aquatic passage enhancement at two different sites on 46N03 and 47N77. Pre-project photo points were taken in 2009. China Creek is a tributary to the Klamath River and Fish Gulch is a tributary to Horse Creek (tributary to Klamath River). Both of these sites experienced early winter storms in September and October during implementation. A series of storms from October 23rd through 25th had a measured total of almost 5 inches of precipitation, with a 24 hour period exceeding 3 inches. The Fish Gulch crossing was nearly finished during this large October event, but the China Creek crossing was still under construction (Figure 3). The Implementation evaluation for Active Project was fully met at both sites. The Effectiveness evaluation

for Active Project was not met for “sedimentation of channel riffle substrate” at both sites (Figure 4a & b).

Upper West Branch Fish Passage, Happy Camp District

This fish passage project on Forest Service Road 48 (Grayback Road) had an Active Project Evaluation in 2008, but the bridge was not completed until 2009. The Post-project **E13** effectiveness evaluation had mediocre results due to a temporary bypass road built upstream of the construction site resulting in a disturbed channel >3 and <5 active channel widths upstream, but still passed criteria (Figure 5).

In-Channel Construction met BMP implementation requirements but failed effectiveness requirements at two out of three sites.

E14 Temporary Road Construction (1 site)

Tennis Thin unit 4, Oak Knoll District

The temporary road that was reviewed was a pre-existing temp road. This road is mostly in unit 4 and allows access for units 4, 5 and 6. At the completion of logging units 4, 5 and 6, this road was water-barred, had slash spread on it and was effectively closed. Overall, this road is located on the upper slopes and has no channel crossings. There was no visual evidence that soil left the road prism. There were no rills on roadbed and no rills at outlets to water bars. There was some evidence of sheet erosion in areas without cover. There are also lots of areas with conifer needle cover. Areas with pine needle cover have 50-90% cover where areas with fir needles have 30-50% cover. The beginning of the temporary road is covered with slash (limbs and small diameter trees) for erosion control as well as closing the road to all vehicle use. The combination of slash and water bars effectively control road runoff.

Temporary Road Construction met BMP implementation and effectiveness requirements

E16 Water Source Development (2 sites)

Road 11 – This site is located on the Oak Knoll Ranger District. The water source is a low water crossing that has not been recently used, even though it was identified as a possible water source for the Tennis Thin Timber Sale in 2009. There were no issues with BMP implementation or effectiveness.

Road 37N07 – This site is located on the Salmon River Ranger District. This water source was developed at or about the time of the Hog Fire (1977) and construction of the China Gulch trail head road. The water source was used in 2004 during the Petersburg Decommissioning Project, and Upper South Fork Road Restoration Project. It was again used in 2007 during the China Ray Timber Sale. During the Caribou Complex (2008) it was the only accessible water source on the south flank of the fire. It was used again during the BAER implementation for the Caribou Fire, at which time the approach to the water source was rocked and graded. The water source was most recently used in the resumption of China Ray harvest and haul. This site met or exceeded design and maintenance standards and there were no issues affecting water quality.

Water Source Development met BMP implementation and effectiveness requirements

E17 Snow Removal (3 sites)

Pan-Siskiyou Reforestation, Happy Camp District

This post wildfire reforestation project required snow plowing, in late spring to access high elevation tree planting units. Road 15N19 was plowed multiple times due to several cold storms producing

snowfall with interim vehicle traffic. The site surveyed had good effectiveness for all evaluation criteria except “road rutting by vehicles” since > 10% of road surface had ruts > 2” deep.

Caribou Site Prep, Salmon River District

This post wildfire reforestation project required snow plowing, in early spring to access high elevation tree planting units. There were no issues with BMP effectiveness at this site.

Crapo Creek Tree Planting, Salmon River District

This post wildfire reforestation project required snow plowing, in early spring to access high elevation tree planting units. There were no issues with BMP effectiveness at this site.

Snow Removal met BMP implementation and effectiveness requirements

E19 Restoration of Borrow Pits and Quarries (1 site)

Horsethief Cinder Pit, Goosenest District

This site was used for suppression rehab projects on the Mt. Hebron Fire (2009) and the Penoyar Road Improvement Project.

All requirements for BMP Implementation and Effectiveness were fully met for this cinder pit

E20 Protection of Roads (2 site)

Tea Garden Timber Sale, Salmon River Ranger District

Road 40N45 had minor ruts after a rain event. The road was back-bladed and drain-outs were built. All of the soil that moved stayed on the road prism and did not leave the road. All requirements for BMP Implementation and Effectiveness were fully met for wet weather operations on this road. Road 40N51 was protected when operations and hauling were stopped due to heavy rains.

Protection of Roads met BMP implementation and effectiveness requirements

Recreation Activities

R22 Developed Recreation Sites (1 site)

Beaver Creek campground, Oak Knoll District

This campsite is on a stream terrace just below the main Beaver Creek road (Forest Road 11). The southern-most or downriver end of campground has one site that has a short unofficial user created trail to the river. A small amount of sediment from ground disturbance reaches the channel. Ground cover in the SMZ ranged from 90-100% and averaged 96% cover. Runoff from the campground access road enters the well vegetated SMZ. No evidence of runoff reaching the channel. This campground has a vault style toilet facility. No cracks or leaks were observed on this structure. This campground does not have Forest Service trash cans. No trash was observed within the campground. At the time of inspection 5 camping sites were occupied. This campground is used mostly during hunting season.

Developed Recreation Sites met BMP implementation and effectiveness requirements

R30 Dispersed Recreation Sites (3 sites)

Three sites were evaluated on the Salmon River District:

Redbank river access has a S-shaped access road to the river’s edge. There is plenty of room for a dispersed camp site. A stone fire ring is present and there is area for a tent. The site was clean with no trash or human waste. There is road erosion occurring but it gets diverted into a well vegetated area at

one of the S-turns.

Thomaine River Access has a very steep 4x4 vehicle access road (need high clearance vehicle). This area has a vehicle turn around and a couple of camping sites. There were a few pieces of toilet paper or paper towels. No human waste was evident. There is a rough foot access trail to the river. Approximately 150 feet from the vehicle turnaround there is a semi-improved camping site. This side has a metal circular fire pit, campground type table, sink and counter top with running water. There is a constructed toilet structure approximately 175-200 feet from the river and also about 25 feet higher than the river. This toilet structure does not utilize a pit for the human waste.

Jackass Gulch River Access is a very short spur road that provides access to the North Fork Salmon River. It is narrow and does not have enough room for a vehicle to turn around. The edge of the access road and river's edge is rocked with gravel. There were vehicle tracks but access is too small to be used as a camping site unless a truck with camper shell is used. No erosion is entering the river.

Dispersed Recreation Sites met BMP implementation and effectiveness requirements

Range Management Activities

G24 Range Management (4 sites)

Three allotments on the Scott River District including, East Fork, Eagle Creek, and Etna Creek and one allotment on the Goosenest District, Mt. Hebron, were chosen for BMP sampling. Samples were taken near long term transects, or key areas. Herbaceous utilization was met at two of the three sites, one site met >80% of the utilization standard and guidelines. Corrective actions were taken to obtain compliance. All sites met the woody utilization standards and guidelines.. Table 3 gives the effectiveness rating for each sample site for streambank stability, according to the BMPEP form. Recommendations were made for the one allotment where samples indicated less than 80% stable streambank observed. All sites received the highest floodplain erosion and riparian vegetation criteria rating, with one exception. Shade measurements for the streams were also conducted using a solar pathfinder. Shade was measured at 20 transects along the reach. Percent shade during August was taken for each of transect.

East Fork Allotment, Robbers Meadow Unit

The monitoring meadow is a sloping fen. Cattle tend to stay on the drier areas of the meadow and avoid the wet peat parts therefore reducing the amount of visible trampling and trailing. No riparian woody species were present on the stream reach but there are pines providing shade to the stream (an average of 55% of the reach is shaded). Through general observation and historic pictures, it appears the meadow is being encroached upon by conifers. Streambank stability is provided by down wood, large rocks, and deep rooted sedges. Few cattle crossings can be seen on this stream even though the reach is fairly open. Implementation standards and guidelines were met and all effectiveness criteria were in the highest category.

Eagle Creek Allotment, Upper Eagle Creek Unit

The meadow consists of several springs that slope down to a small channel. The meadow is surrounded and dissected by a pine community. The meadow does not support woody riparian shrubs but a little shade for the stream is provided by pine trees at the edge of the meadow. Average shade from trees was

15%. The channel is deep and narrow so most of the stream shading is due to streambanks. Streambanks are densely vegetated which keep the streambanks stable. Implementation standards and guidelines were met and all effectiveness criteria were in the highest category. Spring areas were saturated, well vegetated, and generally not disturbed by hoof-prints.

Etna Creek Allotment, Meeks Meadow Unit

Two meadows were sampled in this meadow complex. One part of the meadow has a response channel running through the meadow while the other part of the meadow complex edges a small lake and has quite a bit of ponded water. When averaged, herbaceous utilization met >80% of the standard and guidelines. Woody utilization standards and guidelines were met. Woody riparian shrubs line over 60% of the stream reach. Some willow browse was observed but no alders were browsed. Effectiveness ratings were in the highest category except for bank stability, which was 73% stable along the stream reach and habitat disturbance, where <10 of the lentic habitat was effected by livestock hoof prints and trails (Figure 6). An average of 85% of this stream reach is shaded. Riparian shrubs are important in keeping the streambanks stable. Several cattle crossings and hoof shears were observed in openings along the creek bank. The lake by the meadow is receding due to a failing dam, which has left a lot of standing water. The meadow is changing rapidly and there are an abundance of young willows growing at the edge of the receding water. Some pond habitat has been altered (trails and soil exposed by hoof prints) by cattle as they move through the meadow.

Mt Hebron Allotment

The sample area that was chosen for the Mt Hebron allotment was along Horsethief Creek between Highway 97 and the railroad tracks. Horsethief Creek was dry at the time of monitoring but carries flow during snowmelt in spring. The creek is low gradient and well armored in most sections. There are two excavated ponds along Horsethief Creek that are used as watering holes for cattle. There was evidence of heavy utilization from previous years throughout the allotment, with heavily browsed shrubs, and areas of exposed soil. However, the allotment shows signs of recovery with unbrowsed year's growth on many of the shrubs, and good stubble height. The number and class of livestock have been adjusted within the last few years to reduce impacts on the allotment. The streambank meets standards for stability and vegetation throughout with the only exception being at the two ponds, where signs of concentrated use by cattle include heavy trampling, over-browsing, and bank instability. The ponds occupy less than 20% of the sampled reach, so stream bank stability on the whole is not below standards.

Table 3- Summary of Bank Stability Ratings for Range Management Samples

Allotment and District	Pasture Unit	Bank Stability Rating from G24 Form		
		>80%	70-80%	<70%
East Fork, Scott River	Robbers Meadow	X		
Eagle Creek, Scott River	Upper Eagle Creek	X		
Etna Creek, Scott River	Meeks Meadow		X	
Mt. Hebron, Goosenest	NA	X		

Range Management Activities met BMP implementation and effectiveness requirements

Fire and Fuels Management Activities

F25 Prescribed Fire (6 sites)

Glassups Underburn, Salmon River District

Three underburn units were evaluated in the Glassups Project. Unit 160 had a measured soil cover of 85%. Vegetation type is Douglas fir with black oak. The surface soil is gravelly to very gravelly loam with some extremely gravelly loam. The parent material is metasedimentary. Slopes range from 50-65%. The unit was understory thinned and then burned in 2008. Unit 165 had a measured soil cover of 97%. Vegetation type is Douglas fir with black oak. The surface soil is extremely gravelly loam. The parent material is peridotite with some metasedimentary. Landform is dormant landslide bench and scarp. Slopes range from 15-65%. The unit was understory thinned and then burned in 2008. Unit 172 had a measured soil cover of 90%. Vegetation type is mixed conifer (DF, WF, IC, SP). The surface soil is mostly extremely gravelly loam. The parent material is metasedimentary. Slopes range from 50-65%. Part of the unit was understory thinned and then burned in 2008.

HCFP Phase II, Happy Camp District

One underburn unit was evaluated in the HCFP Phase II Project. The Perkins Gulch unit had a measured soil cover of 88%. Vegetation type is Douglas fir with black oak and white oak. The surface soil is gravelly to very gravelly loam with some extremely gravelly loam. The parent material is metasedimentary. Slopes range from 50-65%. The unit was burned in 2008.

Greenthin Project, Happy Camp District

One underburn unit was evaluated in the Greenthin Project. Unit in 4 Bit Gulch had a measured soil cover of 82%. Vegetation type is Douglas fir with some white fir. The surface soil is gravelly to very gravelly loam. The parent material is metasedimentary. Slopes range from 50-65%. The western part of the burn unit was understory thinned and the eastern part was a natural unlogged stand. The unit was burned in 2008.

Switchback Timber Sale, Scott River District

One underburn unit was evaluated in the Switchback Timber Sale. The underburn unit had a measured soil cover of 81%. Vegetation type is Douglas fir/ponderosa pine with some sugar pine and incense cedar. The surface soil is gravelly to very gravelly loam. The parent material is metasedimentary. Slopes range from 30-60%. It looked like the underburn was a combination of burned hand pile and broadcast underburn prescriptions. The unit was thinned in 2008 and burned in 2009.

Prescribed Fire met BMP implementation and effectiveness requirements

Minerals Management Activities

M27 Common Variety Minerals (1 site)

One gravel pit was evaluated on the Goosenest District. There was some rilling on access roads but rills to not leave the road surface. This gravel pit is in a dry lake bed in an enclosed basin. Siskiyou County Public Works Dept. and the Klamath National Forest are cooperators on this pit. The pit provided aggregate and gravel for the Orr Lake Road Improvement Project.

Common Variety Minerals met BMP implementation and effectiveness requirements

SUMMARY OF NON-RANDOM SITE EVALUATIONS

Tennis Thin Timber Sale

Unit 2 was visited by the project hydrologist on 5/11/2010 at the request of the Timber Sale Administrator to review riparian reserve protection. The area is underlain by dissected, granitic soils derived from granitic rocks associated with the Mt. Ashland pluton. Unit 2 encompasses an ephemeral swale with no signs of seasonal intermittent flow. Side slope along the swales range from 50 to 60%. Remnants of the winter snowfall precipitation were evident into the swale, with no sign of flow below the snow banks. Water appears to infiltrate into the soil, rather than flowing in the swale. As the water infiltrates to an impermeable layer, it gains surface expression as a small wet meadow approximately 240 feet down the swale. The wet area has had a standard riparian buffer of 175ft. The Timber Sale Administrator had blacked out about five trees within the buffer. There will be yarding corridors across the swale, with suspension of the log across the swale. The contract calls for whole tree yarding to minimize soil displacement across the swale.

Unit 10 was visited by the project hydrologist on 5/16/2010 at the request of the Timber Sale Administrator to review riparian reserve protection. The area of concern is an ephemeral swale that carries only snowmelt a few feet before infiltration is complete. The swale has heavy blow down and snow breakage throughout. The mark in light along the flanks of the swale, leaving good root strength and canopy closure. A possible skid route was located adjacent just south of the swale. The route needs to be about 50-75 ft. away from the swale. If the skid trail crosses the swale, it should be done at the point where the slope gradient is low, and cross at a right angle to the swale. After operations complete it is recommended that slash be scattered on the skid trail to break up overland flow, and retard erosion. This practice, BMP 1.17, seems to be more effective on granitic soils than waterbars. At the swale crossing, the flow way should be re-established, by back-blading, and slash scattered on the approaches on both sides of the swale.

Deep Timber Sale

Unit 45 was evaluated for erosion control measures by the project soil scientists and Timber Sale Administrator on 11/16/2010. Eleven waterbars on skid trails within this area were evaluated for their construction and functionality. Four waterbars (35%) did not meet waterbar construction standards. This would not meet BMP standards, which allows only a 10% failure rate. The failures were due to improper construction. The waterbar outlet did not divert water off of the skid trail. In addition, the logging operator placed numerous cull logs on skid trails as runoff deflectors which were de facto water bars. There were nine such features. None of these log deflectors were effective because the bottom of the logs were not sealed with soil material. Runoff on skid trails ran beneath the logs. To mitigate these problems, waterbars were reconstructed by hand and cull logs were sealed with soil.

Shackleford Trailhead Corral

The Shackleford Trailhead corral was visited by the Forest hydrologist on 7/21/2010 to investigate a claim that the corral is a source of fecal coliform bacteria in Shackleford Creek. The corral is located at the end of the road and has a cattle loading area that is separate from the main trailhead parking. The corral is owned by Timber Vest but operated by the Forest Service. The corral is approximately 100 ft. wide by 130 feet long. The edge of the fence is located approximately 45 feet from the creek and the entire corral is well within the riparian reserve of Shackleford Creek. A portion of the corral drains into a ditch along the edge of the road, which then drains into Shackleford Creek. The road in front of the

corral also drains into the ditch and creek. Both the corral and the road surface are heavily used by livestock and are partially covered with animal waste. This entire area has compacted soils that would produce overland flow in response to summer thunderstorms or spring snowmelt. Animal wastes on these surfaces could easily be transported into the creek due to the direct connectivity with the stream. A small spring is located inside the corral near the back fence. The streambanks around the spring have been trampled by cattle, riparian vegetation is absent, and animal waste is located in the water. Surface water from the spring flows through the corral, and then empties into the ditch along the edge of the road. The spring was barely flowing in July and probably dries up later in the year. About $\frac{3}{4}$ of the corral area drains into the spring and would be a source of surface runoff to the creek during summer thunderstorms.

Due to issues with facility design and sediment runoff into channel, the Shackleford Trailhead corral failed both BMP implementation and effectiveness for developed recreation sites (R22). Proposed mitigation options include fencing off the spring from the corral, relocating the corral away from the stream, or removing the corral.

A field review of the site was conducted with staff from the Regional Water Board to identify corrective actions. A temporary fence was constructed around the spring to keep stock away from the wetland. Seasonal flow from the spring was redirected into vegetation outside of the corral, and straw bales were installed to filter run-off entering the spring area. Alternatives for a long-term solution are being planned pending funding and NEPA analysis.

Lover's Camp Corral

The Lover's Camp corral was visited by the Forest hydrologist District staff on 8/11/2010. The purpose of the visit was to investigate a complaint that the corral and a nearby picnic table are a threat to water quality.

The wetland boundary was not delineated, but the corral is clearly outside of the area with wetland soils and vegetation. The southwest corner of the corral is about 35 feet from the wetland, and the south east corner about 20 feet from the wetland. The area between the corral and the wetland supports dense vegetation of grass, ferns, and alders that provides a highly effective filter for any runoff from the corral. There is no evidence of soil movement into or through the buffer and there is no delivery of runoff to the wetland.

A small area of bare soil exists around a table and fire ring, but the ground is flat with no evidence of surface erosion. There is a buffer of thick vegetation between the table and the wetland. The buffer is about 20 feet wide and appears to be adequate to prevent any effect on the wetland.

Both the corral and the picnic table are well outside of the wetland's riparian reserve. The wetland appears to be intact and properly functioning. Water quality is being maintained due to a lack of any connectivity between the corral and the wetland. Likewise, none of the facilities are a source of contamination in Canyon Creek. The Lover's Camp corral passed both BMP implementation and effectiveness for developed recreation sites (R22).

Wet Weather Operations (WWO) BMP Monitoring

Timber Sale Administrators provide notes on BMP WWO for roads and skid trails for timber sales on the Forest (Appendix B). The BMP problems that are noted occur due to rain, snow, or thawing roads. The corrective actions that take place are mostly preventative; operations are delayed or shut down. These actions have generally been effective in meeting BMP requirements and limiting potential negative impacts to water quality.

ADAPTIVE MANAGEMENT DISCUSSION

1. Practices that are working well

Most of the 21 activities evaluated in 2010 met BMP compliance and were effective at controlling nonpoint pollution. These included all timber sale activities; minerals management activities, fire and fuels activities, range management, and recreation sites; and most road engineering activities. Management should continue to use these practices on all future projects.

The problem areas that were identified in the Klamath National Forest 2009 BMPEP report showed improvements in 2010. These included Water Sources (E16), Skid Trails (T02), and Grazing (G24).

In 2009, water sources were highlighted as a problem because many were constructed before more stringent design standards were in place. Also noted in the 2009 report was a suggestion to improve water sources in conjunction with other projects. In 2010, water sources that were evaluated passed because they have been brought up to current design standards as part of project implementation. Additionally, the Forest is working to compile a complete list of water sources to aid in prioritization of watershed sediment source reduction.

Adaptive management has led to improvements in range management in 2010. On the sites that demonstrated bank instability in 2009, protective measures were applied. In one location electric fencing was placed along the site to keep cattle out during the early grazing season (Figure 7) and in the other location the permittee reduced the amount of time cattle spent at the site and utilization was kept under 40% (Figure 8). Multiple Indicator Monitoring (MIM) plots are also being installed on grazed streams on the Westside allotments so that condition and trend can be determined. Short term indicators including stubble height, browse, streambank alteration are measured annually on these plots and correlated to trend so that grazing standards may be refined and applied in order to protect water quality and riparian vegetation.

In 2009, one site failed effectiveness requirements for skid trails. Corrective action to repair waterbars was taken after issues were discovered during monitoring. Continued communication between earth scientists and Timber Sale Administrators has helped to identify skid trail construction that will effectively eliminate sediment loss from the site. These efforts include field visits to the Tennis Thin Timber Sale and Deep Timber Sale, which are reported in the Non-Random Site Evaluations section of this report.

2. Practice applications that can be improved

The 2010 project BMPs were largely implemented as planned and effective. The only activity group that had effectiveness rating of “at-risk” or failures was engineering.

E08 Road Surface and Slope Protection

Though BMP requires were met, two out of four sites received a rating of “at-risk” for effectiveness failure. The issues that were identified resulted from a decomposed granitic fill slope that was not adequately mulched and/or armored. This led to numerous large rills and gullies which transport sediment to the outlet. This was identified as a possible oversight in the design of the crossing and/or contract requirements. A possible solution is better project design that accounts for sensitive soil types such as decomposed granitics and better Forest oversight of project implementation.

E09 Stream Crossing

Two out of five stream crossing sites were rated as failing effectiveness measurements in 2010. On road 16N05, problems with culvert diversion potential and plugging lead to effectiveness failure. Sediment and debris was starting to accumulate in the culvert and if the culvert were to fail, flow would be diverted out of the channel and down the roadway. However, the road and surrounding landscape is nearly flat (less than 2% slope) which would result insignificant water quality impacts should the culvert plug and divert down the road way. Due to the low risk of adverse effects to water quality, this site is not a high priority to upgrade; there other stream crossings identified that would provide a greater benefit to water quality if upgraded. On road 15N06, lack of effective soil cover on fill slopes and numerous rills with evidence of sediment delivery to the channel lead to effectiveness failure. One of the two stream crossings on road 15N43 had scour evident more than two channel widths below the outlet, but was rated as effective because water quality was not adversely affected. Problems identified were similar to those in the E08 evaluation; more slope protection was needed in design and/or slope stabilization requirements of seeding and mulching were not met. The solutions include better slope protecting in project design and better Forest oversight of project implementation.

E13 In-Channel Construction

Two out of three in-channel construction projects were rated as failing effectiveness in 2010. Two in-channel construction projects in the China-Fish Aquatic Passage experienced early winter storms in September and October during implementation. The Fish Gulch crossing was nearly finished during this large October event, but the China Creek crossing was still under construction. The Effectiveness evaluation for Active Project was not met for “sedimentation of channel riffle substrate” at both sites. The cause of the effectiveness failure is due to the fact that the contract was awarded later than expected and the contractor did not complete the project prior to the winter.

CONCLUSIONS AND CONSIDERATIONS

In 2010, implementation standards for BMPs were 100% compliant on all evaluated sites. BMP effectiveness requirements were fully met on 88% of the sites evaluated and 5% fell into the “at-risk” category. Improvements have been made in activities identified in 2009 as needing improvements, including grazing, water sources, and skid trails. Further improvement in BMP effectiveness is needed for road surface and slope protection (E08), stream crossings, (E09), and in-channel construction (E13).

The majority of practices evaluated in 2010 were highly successful, owing to management's commitment and the training and experience of project planners and implementers. This needs to be encouraged in order to continue the Forest's BMP successes. Suggestions made in the Adaptive Management discussion can improve BMP performance even further.

REFERENCES

USDA, Forest Service, 2002, Investigating Water Quality in the Pacific Southwest Region: the Best Management Practice Evaluation Program (BMPEP) User's Guide, USDA, Forest Service, Pacific Southwest Region.

Appendix A. BMP Evaluation Procedure Names and Descriptions.

<i>Procedure #</i>	<i>Procedure Name (BMPs Monitored)</i>
T01	Streamside Management Zones (BMP 1.8, 1.19, 1.22)
T02	Skid trails (BMP 1.10, 1.17)
T03	Suspended yarding (BMP 1.11)
T04	Landings (BMP 1.12, 1.16)
T05	Timber sale administration (BMP 1.13, 1.20, 1.25)
T06	Special erosion control and revegetation (BMP 1.14, 1.15)
T07	Meadow protection (BMP 1.18, 1.22, 5.3)
E08	Road surface, drainage and slope protection (BMP 2.2, 4, 5, 10, 23)
E09	Stream crossings (BMP 2.1)
E10	Road Decommissioning (BMP 2.26)
E11	Control of side cast material (BMP 2.11)
E12	Servicing and refueling (BMP 2.12)
E13	In-channel construction practices (BMP 2.14, 2.15, 2.17)
E14	Temporary roads (BMP 2.16, 2.26)
E15	Rip rap composition (BMP 2.20)
E16	Water source development (BMP 2.21)
E17	Snow removal (BMP 2.25)
E18	Pioneer road construction (BMP 2.3, 2.8, 2.9, 2.19)
E19	Restoration of borrow pits and quarries (BMP 2.27, 2.18)
E20	Management of roads during wet periods (BMP 2.24, 7.7)
R22	Developed recreation sites (BMP 4.3, 4, 5, 6, 9, 10)
R23	Location of stock facilities in wilderness (BMP 4.11)
G24	Range management (BMP 8.1, 8.2, 8.3)
F25	Prescribed fire (BMP 6.3)
M26	Mining operations (Locatable minerals) (BMP 3.1, 3.2)
M27	Common variety minerals (BMP 3.3)
V28	Vegetation manipulation (BMP 5.1, 5.2, 5.5, 5.7)
V29	Revegetation of surface disturbed areas (BMP 5.4)
R30	Dispersed Recreation Sites (BMP 4.5, 4.6, 4.10)

Appendix B Non-Random BMP Monitoring

FY 2010 Season Notes

Wet Weather Operations BMP Monitoring

T05 Timber Operations and E20 Management of Roads during Wet Periods

Documentation of monitoring is found in timber sale contract folders in *BMP – WWO Seasonal Report Tables*.

Table summarizing Wet Weather Operations and related BMP monitoring

Project	BMPEP Status	BMP Problem	Location	Date	WWO comments/Corrective action
Mt Ashland Stewardship	Meets	Rain	All roads	10/27/09	Delay starting ops
	Exceeds	Rain	Unit 759	5/27/10	No operations- too wet
	Meets		Unit 759	6/2/10	Soil dry enough to top 10"
	Exceeds	Soil moisture	Unit 759, 380	6/3/10	Operations ceased- too wet
	Meets	Rain/snow	All roads	10/25/10	Skidding, harvesting, hauling terminated
	Meets		Skid and Temp roads	10/25/10	Water bars effective
	Meets	Rain	Road 40S06	11/8/10	No ops
	Meets	Rain	Road 40S06	11/15/10	WWO met, endline OK
Westside Road Hazard	Meets	Rain	All roads	11/9/10	No ops due to recent precipitation
Shasta View TS	Meets	Ruts	Road 43N22	1/13/10	No standing water, short length
	Meets	Snow	Road 43N18	1/21/10	Snow bladed off road, left 2"
	Meets	Snow	Road 43W72	2/4/10	Surface frozen, no runoff
SO Plant	Meets	Melt	Road 44N25	3/2/10	Operations terminated due to wet road and soil conditions
	Meets	Melt	Road 44N31Y	3/2/10	Operations terminated due to wet road and soil conditions
	Meets	Snow	Road 44N26	3/8/10	Frozen soil, OK

Lodgepole	Meets	Snow		4/22/10	Melting snow suspended operations
Roundsink	Meets	Melt	Unit 59, Roads 44N93, 44N93A, 44N98	1/6/10	Slight thawing, no ruts on forest floor. 2-4in ruts in road. Soil and water not leaving the road. Ruts from traffic will be repaired when bladed
	Meets	Melt	Unit 59, 61 and landings, Roads 44N93, 44N98	2/1/10	Slight thawing, no ruts on forest floor. 2-4in ruts in road. Soil and water not leaving the road. Ruts from traffic will be repaired when bladed
Shovel	Meets	Rain	Unit 1 landings, Roads 46N05, 46N06, 70	9/21/10	Received <1/2in of rain on 9/20. Very helpful with dust abatement. Roads and skid trails look good
	Meets	Rain	Unit 2 landing, temp roads Road 70	10/25/10	First good storm of the fall season, over 1 in or rain, turning to snow. Soil still dry 2-4 in down. Only vehicle traffic on roads
	Meets	Snow	Unit 2 landing, temp roads Road 70	11/3/10	Operating on snow in woods 4-6". Soil still dry 4-6" down under trees. Only vehicle traffic on roads
	Meets	Snow	Unit 1, 2 temp roads, Road 70	11/17/10	Still working on snow, hauling out of unit 2. 4-6" of snow, cold, ground frozen.
	Meets	Melt	Unit 1, 2	12/10/10	Purchaser stopped hauling operation when temp went above 32 degrees
Railroad	Meets	Melt	Unit 29, 37	4/22/10	Operations stopped early AM, starting to warm. Will wait for freezing or more drying
	Meets	None	Unit 29, 7	5/3/10	Start of felling operations. Ground meeting soil BMPs
	Meets	Dust	Unit 1, 16 Road 4M08, 44N18Y	5/17/10	Ground and roads dry. Should need dust abatement soon
	Meets	Dust	Unit 25 Road 4M08	5/26/10	Received some light showers to help dust abatement

	Meets	Dust	Unit 25 Road 4M08 44N18Y	6/7/10	Received some light showers to help dust abatement
	Meets	Dust	Unit 29, 25 Road 4M08 44N18Y	6/25/10	Soil conditions dry. Watering roads
	Meets	None	Unit 25, 26	7/19/10	Felling and skidding operations completed. Dry soils. Erosion control water bars still to do
Horse Heli	Meets	None	Unit 13B, 491	8/30/10	Start of operation. Soils dry, last good rain on 6/3 and 6/4
	Meets	Dust	Unit 47B Roads 47N31Y 40S01 47N40	9/17/10	Still dry, roads being watered
	Meets	Rain	Unit 47B Roads 47N31Y 40S01 47N40	9/30/10	First good storm. Less than 1in or rain on 9/19. Soil still dry below 1in.
	Meets	Rain	Unit 47B Roads 47N31Y 40S01 47N40	10/21/10	Remained dry since 9/19. Forecast calling for rain. Erosion control work being kept current
	Meets	Rain	Roads	10/25/10	Roads too wet to support haul, operations shut down
	Meets	Rain	Unit 126, road 47N99, 47N59, 12	11/3/10	Operations stopped. Too wet to operate
	Meets	Melt	Road 47N99, 47N59, 12, 47N60	11/11/10	Hauling done when roads are either frozen or dry
	Meets	Snow	Units 34A, 223	11/11/10	Processor operating on snow or slash. Some rutting but slash will keep reduce erosion. Will check in spring to see if further work is needed

McBaldy	Meets	Dust	Unit 89 Road 45N49, 45N46, 45N79Y	8/24/10	Start of operation, soils dry. Last storm with measurable rain end of July. Watering roads for dust
	Meets	Rain	Unit 90 Road 45N49, 45N46, 45N79Y	9/22/10	Early storm on 9/20. Help settle dust. No erosion from storm
	Meets	Rain	Unit 47, 48 Road 45N49, 45N28, 45N53	10/14/10	Weather has stayed dry, storms predicted in long range forecast. Erosion control work will be kept current with operations
	Meets	Snow	Unit 47, 48 Road 45N49, 45N28, 45N53	10/27/10	Snow and freezing temps. Haul route in good condition with no rutting. Most of the corridors have 85% soil cover by slash
	Meets	Snow	Unit 101 road 45N49	11/17/10	Road staying frozen or packed snow
	Meets	Snow	Road 45N49	12/14/10	Road staying frozen or packed snow

Appendix C – Site Photos



Figure 1. Rills and gullies on insufficiently protected decomposed granite fill slope on road # 15N06



Figure 2. Gully with evidence of sediment delivery to channel on road #15N06



Figure 3. Completed culvert installation at the China Creek site.



Figure 4a



Figure 4b

Riffle substrate composition on Fish Gulch upstream of construction site on top (4a) compared to downstream on the bottom (4b) shows a discernible difference in sediment deposition.



Figure 5. Upstream of construction site, disturbed site due to bypass in foreground.



Figure 6. Trampling next to pond in Meeks Meadow



Figure 7. Electric fencing to protect creek banks during the early part of the grazing season.



Figure 8. Less than 40% utilization at Hamilton Camp which reduced streambank trampling in 2010.

Appendix D – Comparison of Evaluation Accomplishment with Target for KNF

Evaluations were accomplished for a total of 59 sites, using 21 protocols to assess timber, engineering, recreation, grazing, and minerals management. The Klamath had a target of 58 sites using 26 protocols.

T01 – 4 of 4 were done.

T02 - 3 of 3 were done

T03 – 2 of 2 were done

T04 - 4 of 3 were done

T05 – 1 of 2 were done

T06 -2 of 1 were done.

T07 – 0 of 1 were done.

E08 – 4 of 3 were done.

E09 - 5 of 4 were done.

E10 – 3 of 4 were done.

E11 – 4 of the 3 were done.

E12 – 0 of 1 were done.

E13 – 3 of 2 were done.

E14 – 1 of 1 were done.

E16 – 2 of 2 were done.

E17 – 3 of 3 were done.

E19 – 1 of 1 were done.

E20 - 2 of 1 were done.

R22 – 1 of 1 were done.

R30 – 3 of 2 were done.

Appendix C – continued

G24 – 4 of 4 were done.

F25 – 6 of 5 were done.

M26 – 0 of 1 were done.

M27 – 1 of 1 were done.

V28 – 0 of 2 were done.

V29 – 0 of 1 were done.